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<110> ML4 Foundation
       Goldin, Ehud
       Slaugenhaupt, Susan A.
       Sun, Mei
       Acierno, James S.

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cgggcggaac gctagcggtg ttggcgcgga gtggaccccg gctgcggccc ctgggtgagt    13020

ctgggtttcc gttagcctcg caggggtgtc ccttcgaggg tcgttagcga gcctccgctt    13080

tcccacgatc tgtcctccga ttcttgttaa ctctagactt tctgatgttc ccataccccc    13140

cacgtctcgg caggtgtttc cacaccggta gccagctgtg ccctgaggtg gaagaggacc    13200

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cccgaatttc                                                           13270


<210>    2
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<212>    DNA
<213>    Homo sapiens

<400>    2
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ccagcatgac agccccggcg ggtccgcgcg gctcagagac cgagcggctt ctgaccccca     180

accccgggta tgggacccag gcggggcctt caccggcccc tccgacaccc ccagaagagg     240

aagaccttcg ccgtcgtctc aaatactttt tcatgagtcc ctgcgacaag tttcgagcca     300

agggccgcaa gccctgcaag ctgatgctgc aagtggtcaa gatcctggtg gtcacggtgc     360

agctcatcct gtttgggctc agtaatcagc tggctgtgac attccgggaa gagaacacca     420

tcgccttccg acacctcttc ctgctgggct actcggacgg agcggatgac accttcgcag     480

cctacacgcg ggagcagctg taccaggcca tcttccatgc tgtggaccag tacctggcgt     540

tgcctgacgt gtcactgggc cggtatgcgt atgtccgtgg tgggggtgac ccttggacca     600

atggctcagg gcttgctctc tgccagcggt actaccaccg aggccacgtg gacccggcca     660

acgacacatt tgacattgat ccgatggtgg ttactgactg catccaggtg gatccccccg     720

agcggccccc tccgcccccc agcgacgatc tcaccctctt ggaaagcagc tccagttaca     780
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agaacctcac gctcaaattc cacaagctgg tcaatgtcac catccacttc cggctgaaga      840

ccattaacct ccagagcctc atcaataatg agatcccgga ctgctatacc ttcagcgtcc      900

tgatcacgtt tgacaacaaa gcacacagtg ggcggatccc catcagcctg gagacccagg      960

cccacatcca ggagtgtaag cacccagtg tcttccagca cggagacaac agcttccggc      1020

tcctgtttga cgtggtggtc atcctcacct gctccctgtc cttcctcctc tgcgcccgct      1080

cactccttcg aggcttcctg ctgcagaacg agtttgtggg gttcatgtgg cggcagcggg      1140

gacgggtcat cagcctgtgg gagcggctgg aatttgtcaa tggctggtac atcctgctcg      1200

tcaccagcga tgtgctcacc atctcgggca ccatcatgaa gatcggcatc gaggccaaga      1260

acttggcgag ctacgacgtc tgcagcatcc tcctgggcac ctcgacgctg ctggtgtggg      1320

tgggcgtgat ccgctacctg accttcttcc acaactacaa tatcctcatc gccacactgc      1380

gggtggccct gcccagcgtc atgcgcttct gctgctgcgt ggctgtcatc tacctgggct      1440

actgcttctg tggctggatc gtgctggggc cctatcatgt gaagttccgc tcactctcca      1500

tggtgtctga gtgcctgttc tcgctcatca atggggacga catgtttgtg acgttcgccg      1560

ccatgcaggc gcagcagggc cgcagcagcc tggtgtggct cttctcccag ctctaccttt      1620

actccttcat cagcctcttc atctacatgg tgctcagcct cttcatcgcg ctcatcaccg      1680

gcgcctacga caccatcaag catcccggcg cgcaggcgc agaggagagc gagctgcagg      1740

cctacatcgc acagtgccag gacagcccca cctccggcaa gttccgccgc gggagcggct      1800

cggcctgcag ccttctctgc tgctgcggaa gggacccctc ggaggagcat tcgctgctgg      1860

tgaattgatt cgacctgact gccgttggac cgtaggccct ggactgcaga gaccccgcc      1920

cccgaccccg cttatttatt tgtagggttt gcttttaagg atcggctccc tgtcgcgccc      1980

gaggagggcc tggacctttc gtgtcggacc cttggggcg gggagactgg gtggggaggg      2040

tgttgaataa a                                                          2051
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<210> 3
<211> 580
<212> PRT
<213> Homo sapiens

<400> 3

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Met Thr Ala Pro Ala Gly Pro Arg Gly Ser Glu Thr Glu Arg Leu Leu
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Thr Pro Asn Pro Gly Tyr Gly Thr Gln Ala Gly Pro Ser Pro Ala Pro
            20                25                30

Pro Thr Pro Pro Glu Glu Glu Asp Leu Arg Arg Arg Leu Lys Tyr Phe
            35                40                45

Phe Met Ser Pro Cys Asp Lys Phe Arg Ala Lys Gly Arg Lys Pro Cys
    50                55                60

Lys Leu Met Leu Gln Val Val Lys Ile Leu Val Val Thr Val Gln Leu
65                70                75                80

Ile Leu Phe Gly Leu Ser Asn Gln Leu Ala Val Thr Phe Arg Glu Glu
            85                90                95

Asn Thr Ile Ala Phe Arg His Leu Phe Leu Leu Gly Tyr Ser Asp Gly
            100               105               110

Ala Asp Asp Thr Phe Ala Ala Tyr Thr Arg Glu Gln Leu Tyr Gln Ala
            115               120               125

Ile Phe His Ala Val Asp Gln Tyr Leu Ala Leu Pro Asp Val Ser Leu
            130               135               140

Gly Arg Tyr Ala Tyr Val Arg Gly Gly Gly Asp Pro Trp Thr Asn Gly
145               150               155               160

Ser Gly Leu Ala Leu Cys Gln Arg Tyr Tyr His Arg Gly His Val Asp
            165               170               175

Pro Ala Asn Asp Thr Phe Asp Ile Asp Pro Met Val Val Thr Asp Cys
            180               185               190
```

```
Ile Gln Val Asp Pro Pro Glu Arg Pro Pro Pro Pro Pro Ser Asp Asp
        195             200             205

Leu Thr Leu Leu Glu Ser Ser Ser Ser Tyr Lys Asn Leu Thr Leu Lys
        210             215             220

Phe His Lys Leu Val Asn Val Thr Ile His Phe Arg Leu Lys Thr Ile
225                 230             235                 240

Asn Leu Gln Ser Leu Ile Asn Asn Glu Ile Pro Asp Cys Tyr Thr Phe
                245             250                 255

Ser Val Leu Ile Thr Phe Asp Asn Lys Ala His Ser Gly Arg Ile Pro
                260             265             270

Ile Ser Leu Glu Thr Gln Ala His Ile Gln Glu Cys Lys His Pro Ser
        275             280             285

Val Phe Gln His Gly Asp Asn Ser Phe Arg Leu Leu Phe Asp Val Val
        290             295             300

Val Ile Leu Thr Cys Ser Leu Ser Phe Leu Leu Cys Ala Arg Ser Leu
305                 310             315                 320

Leu Arg Gly Phe Leu Leu Gln Asn Glu Phe Val Gly Phe Met Trp Arg
                325             330             335

Gln Arg Gly Arg Val Ile Ser Leu Trp Glu Arg Leu Glu Phe Val Asn
                340             345             350

Gly Trp Tyr Ile Leu Leu Val Thr Ser Asp Val Leu Thr Ile Ser Gly
        355             360             365

Thr Ile Met Lys Ile Gly Ile Glu Ala Lys Asn Leu Ala Ser Tyr Asp
        370             375             380

Val Cys Ser Ile Leu Leu Gly Thr Ser Thr Leu Leu Val Trp Val Gly
385             390             395             400
```

Val Ile Arg Tyr Leu Thr Phe Phe His Asn Tyr Asn Ile Leu Ile Ala
                405   410   415

Thr Leu Arg Val Ala Leu Pro Ser Val Met Arg Phe Cys Cys Cys Val
                420   425   430

Ala Val Ile Tyr Leu Gly Tyr Cys Phe Cys Gly Trp Ile Val Leu Gly
            435   440   445

Pro Tyr His Val Lys Phe Arg Ser Leu Ser Met Val Ser Glu Cys Leu
450   455   460

Phe Ser Leu Ile Asn Gly Asp Asp Met Phe Val Thr Phe Ala Ala Met
465   470   475   480

Gln Ala Gln Gln Gly Arg Ser Ser Leu Val Trp Leu Phe Ser Gln Leu
                485   490   495

Tyr Leu Tyr Ser Phe Ile Ser Leu Phe Ile Tyr Met Val Leu Ser Leu
                500   505   510

Phe Ile Ala Leu Ile Thr Gly Ala Tyr Asp Thr Ile Lys His Pro Gly
            515   520   525

Gly Ala Gly Ala Glu Glu Ser Glu Leu Gln Ala Tyr Ile Ala Gln Cys
    530   535   540

Gln Asp Ser Pro Thr Ser Gly Lys Phe Arg Arg Gly Ser Gly Ser Ala
545   550   555   560

Cys Ser Leu Leu Cys Cys Cys Gly Arg Asp Pro Ser Glu Glu His Ser
                565   570   575

Leu Leu Val Asn
            580

<210>   4

<211> 553
<212> PRT
<213> Homo sapiens

<400> 4

Met Ala Asp Pro Glu Val Val Val Cys Ser Cys Ser Ser His Glu Glu
1   5   10   15

Glu Asn Arg Cys Asn Phe Asn Gln Gln Thr Ser Pro Ser Glu Glu Leu
            20   25   30

Leu Leu Glu Asp Gln Met Arg Arg Lys Leu Lys Phe Phe Phe Met Asn
        35   40   45

Pro Cys Glu Lys Phe Trp Ala Arg Gly Arg Lys Pro Trp Lys Leu Ala
    50   55   60

Ile Gln Ile Leu Lys Ile Ala Met Val Thr Ile Gln Leu Val Leu Phe
65   70   75   80

Gly Leu Ser Asn Gln Met Val Val Ala Phe Lys Glu Glu Asn Thr Ile
            85   90   95

Ala Phe Lys His Leu Phe Leu Lys Gly Tyr Met Asp Arg Met Asp Asp
            100   105   110

Thr Tyr Ala Val Tyr Thr Gln Ser Asp Val Tyr Asp Gln Leu Ile Phe
        115   120   125

Ala Val Asn Gln Tyr Leu Gln Leu Tyr Asn Val Ser Val Gly Asn His
        130   135   140

Ala Tyr Glu Asn Lys Gly Thr Lys Gln Ser Ala Met Ala Ile Cys Gln
145   150   155   160

His Phe Tyr Lys Arg Gly Asn Ile Tyr Pro Gly Asn Asp Thr Phe Asp
            165   170   175

```
Ile Asp Pro Glu Ile Glu Thr Glu Cys Phe Phe Val Glu Pro Asp Glu
        180                 185             190

Pro Phe His Ile Gly Thr Pro Ala Glu Asn Lys Leu Asn Leu Thr Leu
        195                 200             205

Asp Phe His Arg Leu Leu Thr Val Glu Leu Gln Phe Lys Leu Lys Ala
        210                 215             220

Ile Asn Leu Gln Thr Val Arg His Gln Glu Leu Pro Asp Cys Tyr Asp
225                 230             235                 240

Phe Thr Leu Thr Ile Thr Phe Asp Asn Lys Ala His Ser Gly Arg Ile
                245                 250             255

Lys Ile Ser Leu Asp Asn Asp Ile Ser Ile Arg Glu Cys Lys Asp Trp
                260                 265             270

His Val Ser Gly Ser Ile Gln Lys Asn Thr His Tyr Met Met Ile Phe
                275                 280             285

Asp Ala Phe Val Ile Leu Thr Cys Leu Val Ser Leu Ile Leu Cys Ile
        290                 295             300

Arg Ser Val Ile Arg Gly Leu Gln Leu Gln Gln Glu Phe Val Asn Phe
305                 310             315                 320

Phe Leu Leu His Tyr Lys Lys Glu Val Ser Val Ser Asp Gln Met Glu
                325                 330             335

Phe Val Asn Gly Trp Tyr Ile Met Ile Ile Ser Asp Ile Leu Thr
                340                 345             350

Ile Ile Gly Ser Ile Leu Lys Met Glu Ile Gln Ala Lys Ser Leu Thr
                355                 360             365

Ser Tyr Asp Val Cys Ser Ile Leu Leu Gly Thr Ser Thr Met Leu Val
        370                 375             380
```

Trp Leu Gly Val Ile Arg Tyr Leu Gly Phe Phe Ala Lys Tyr Asn Leu
385   390   395   400

Leu Ile Leu Thr Leu Gln Ala Ala Leu Pro Asn Val Ile Arg Phe Cys
                405   410   415

Cys Ala Ala Met Ile Tyr Leu Gly Tyr Cys Phe Cys Gly Trp Ile
                420   425   430

Val Leu Gly Pro Tyr His Asp Lys Phe Arg Ser Leu Asn Met Val Ser
            435   440   445

Glu Cys Leu Phe Ser Leu Ile Asn Gly Asp Asp Met Phe Ala Thr Phe
    450   455   460

Ala Lys Met Gln Gln Lys Ser Tyr Leu Val Trp Leu Phe Ser Arg Ile
465   470   475   480

Tyr Leu Tyr Ser Phe Ile Ser Leu Phe Ile Tyr Met Ile Leu Ser Leu
                485   490   495

Phe Ile Ala Leu Ile Thr Asp Thr Tyr Glu Thr Ile Lys Gln Tyr Gln
                500   505   510

Gln Asp Gly Phe Pro Glu Thr Glu Leu Arg Thr Phe Ile Ser Glu Cys
            515   520   525

Lys Asp Leu Pro Asn Ser Gly Lys Tyr Arg Leu Glu Asp Asp Pro Pro
    530   535   540

Val Ser Leu Phe Cys Cys Cys Lys Lys
545   550

<210>   5
<211>   652
<212>   PRT
<213>   Drosophila

<400>   5

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Met Gln Ser Tyr Gly Pro Gly Ala Gln Thr Ala Pro Ala Val Lys Arg
1               5               10              15

Arg Thr Asp Ser Tyr Glu Ala Ala Gln Gln Gln Gln Ser Pro Glu
        20              25              30

Ser Asp Glu Glu Tyr Val Asn Thr Arg Ile Leu Arg Arg Gln Val Gln
        35              40              45

Leu Gln Ser Thr Pro Val Ala Pro Val Val Pro Met Pro Ile Ser Ala
    50              55              60

Gly Ser Gly Thr Ala Pro Pro Ser Val Asp Gly Arg Glu Glu Gln Pro
65              70              75              80

Glu Phe Pro Gly Ser Ser Ala Ala Ser Tyr Gln Glu Glu Arg Met Arg
                85              90              95

Arg Lys Leu Gln Phe Phe Phe Met Asn Pro Ile Glu Lys Trp Gln Ala
            100             105             110

Lys Arg Lys Phe Pro Tyr Lys Phe Val Val Gln Ile Val Lys Ile Phe
            115             120             125

Leu Val Thr Met Gln Leu Cys Leu Phe Ala His Ser Arg Tyr Asn His
    130             135             140

Ile Asn Tyr Thr Gly Asp Asn Arg Phe Ala Phe Ser His Leu Phe Leu
145             150             155             160

Arg Gly Trp Asp Ser Ser Arg Glu Val Glu Ser Tyr Pro Pro Ala Val
                165             170             175

Gly Pro Phe Ala Leu Tyr Leu Lys Ser Glu Phe Phe Asp Thr Val Gln
                180             185             190

Tyr Ala Val Asn Gly Tyr Ala Asn Val Ser Arg Ser Ile Gly Pro Tyr
        195             200             205
```

Asp Tyr Pro Thr Pro Asn Asn Thr Met Pro Pro Leu Lys Leu Cys Leu
    210   215   220

Gln Asn Tyr Arg Glu Gly Thr Ile Phe Gly Phe Asn Glu Ser Tyr Ile
225   230   235   240

Phe Asp Pro His Ile Asp Glu Val Cys Glu Arg Leu Pro Pro Asn Val
            245   250   255

Thr Thr Ile Gly Val Glu Asn Tyr Leu Arg Gln Arg Asp Val Glu Val
            260   265   270

Asn Phe Ala Ser Leu Val Ser Ala Gln Leu Thr Phe Lys Ile Lys Thr
    275   280   285

Val Asn Phe Lys Ala Asn Gly Gly Pro Leu Ser Ala Pro Asp Cys Phe
    290   295   300

Arg Phe Asp Ile Ser Ile Thr Phe Asn Asn Arg Asp His Asp Gly Gln
305   310   315   320

Met Leu Leu Ser Leu Asp Ala Glu Ala Thr Arg Leu Lys Cys His Gly
            325   330   335

Ala Thr Asp Phe Ile Ser Asp Ala Asn Phe Asp Ser Met Leu Arg Ser
            340   345   350

Val Leu Asn Ile Phe Val Leu Leu Thr Cys Ala Leu Ser Phe Ala Leu
    355   360   365

Cys Thr Arg Ala Leu Trp Arg Ala Tyr Leu Leu Arg Cys Thr Thr Val
    370   375   380

Asn Phe Phe Arg Ser Gln Phe Gly Lys Glu Leu Ser Phe Asp Gly Arg
385   390   395   400

Leu Glu Phe Val Asn Phe Trp Tyr Ile Met Ile Ile Phe Asn Asp Val

```
                    405                     410                     415

Leu Leu Ile Ile Gly Ser Ala Leu Lys Glu Gln Ile Glu Gly Arg Tyr
            420                 425                 430

Leu Val Val Asp Gln Trp Asp Thr Cys Ser Leu Phe Leu Gly Ile Gly
            435                 440                 445

Asn Leu Leu Val Trp Phe Gly Val Leu Arg Tyr Leu Gly Phe Phe Lys
    450                 455                 460

Thr Tyr Asn Val Val Ile Leu Thr Leu Lys Lys Ala Ala Pro Lys Ile
465                 470                 475                 480

Leu Arg Phe Leu Ile Ala Ala Leu Leu Ile Tyr Ala Gly Phe Val Phe
            485                 490                 495

Cys Gly Trp Leu Ile Leu Gly Pro Tyr His Met Lys Phe Arg Ser Leu
            500                 505                 510

Ala Thr Thr Ser Glu Cys Leu Phe Ala Leu Ile Asn Gly Asp Asp Met
            515                 520                 525

Phe Ala Thr Phe Ala Thr Leu Ser Ser Lys Ala Thr Trp Leu Trp Trp
    530                 535                 540

Phe Cys Gln Ile Tyr Leu Tyr Ser Phe Ile Ser Leu Tyr Ile Tyr Val
545                 550                 555                 560

Val Leu Ser Leu Phe Ile Ala Val Ile Met Asp Ala Tyr Asp Thr Ile
            565                 570                 575

Lys Ala Tyr Tyr Lys Asp Gly Phe Pro Thr Thr Asp Leu Lys Ala Phe
            580                 585                 590

Val Gly Thr Arg Thr Ala Glu Asp Ile Ser Ser Gly Val Phe Met Thr
            595                 600                 605
```

```
Asp Leu Asp Asp Phe Asp Gln Thr Ser Phe Leu Asp Val Val Lys Ser
    610             615                 620

Ile Cys Cys Cys Gly Arg Cys Gly Arg His Gln Glu Pro Ala Gln Pro
625             630                 635                 640

Asn Ser Gly Tyr Thr Ser Leu Ser Ser Ile Met Lys
                645                 650
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<210>   6
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<212>   DNA
<213>   Artificial Sequence

<220>
<223>   PCR primer

<400>   6
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<210>   7
<211>   25
<212>   DNA
<213>   Artificial Sequence

<220>
<223>   PCR primer

<400>   7
aacaccctcc ccacccagtc tcccc   25

<210>   8
<211>   21
<212>   DNA
<213>   Artificial Sequence

<220>
<223>   PCR primer

<400>   8
caacctctac taccctctcc c   21

<210>   9
<211>   18

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<212>    DNA
<213>    Artificial Sequence

<220>
<223>    PCR primer

<400>    9
aacagtgaag cctcgtcc                                                      18


<210>    10
<211>    23
<212>    DNA
<213>    Artificial Sequence

<220>
<223>    PCR primer

<400>    10
gatataaatg gcaggcagct ttc                                                23


<210>    11
<211>    20
<212>    DNA
<213>    Artificial Sequence

<220>
<223>    PCR primer

<400>    11
ctcaccgtgc tggaagacac                                                    20
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